

# Legal, Liability and Public Acceptability Aspects of CCS

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Advanced Coal Technology  
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Crystal City, VA

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## Today's Talk

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- Overview
- Legal and Liability Issues
- Public Perception and Acceptability
- Ongoing International Activities
- Conclusions



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## WRI View on CCS

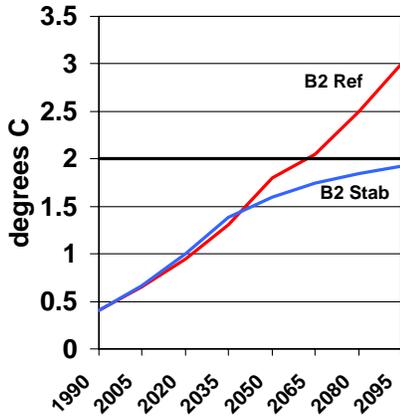
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- CCS is essential component of climate strategy
- Technology largely exists, but integration and geologic “unknowns”
- Mitigation driver needed for wide-scale deployment
- Policy, regulatory, and institutional voids
- Public acceptance uncertain
- Developing country participation crucial, but U.S./Annex I leadership needed first

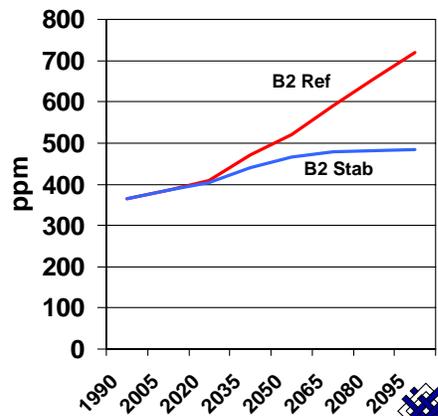


# One Version of the Climate Challenge...

Global Mean Temperature Change From Pre-Industrial



CO2 Concentration

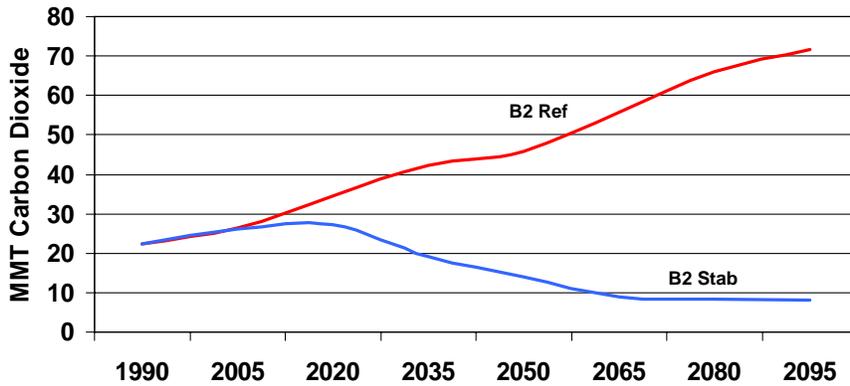


Source: J. Edmonds, Battelle, 2004.

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# ..and implications for global CO<sub>2</sub> emissions

Fossil Fuel Carbon Emissions

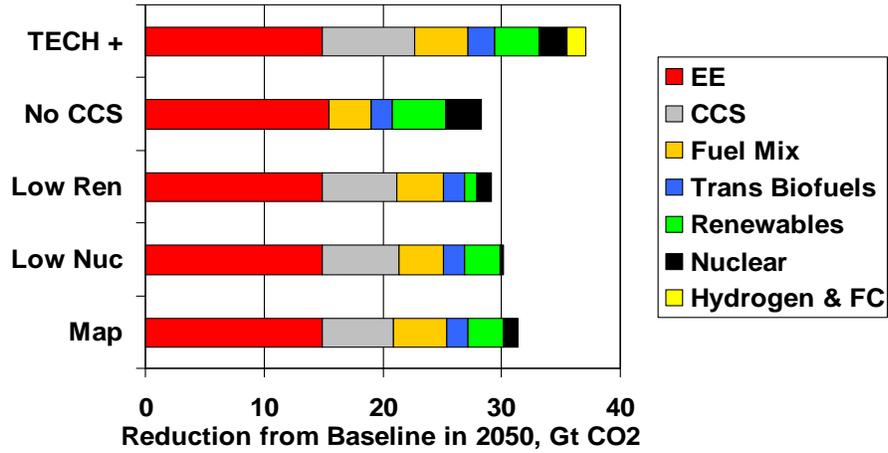


Global Emissions should peak within 15 years

Source: J. Edmonds, Battelle, 2004.

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# Global Reductions in CO<sub>2</sub> by Factor

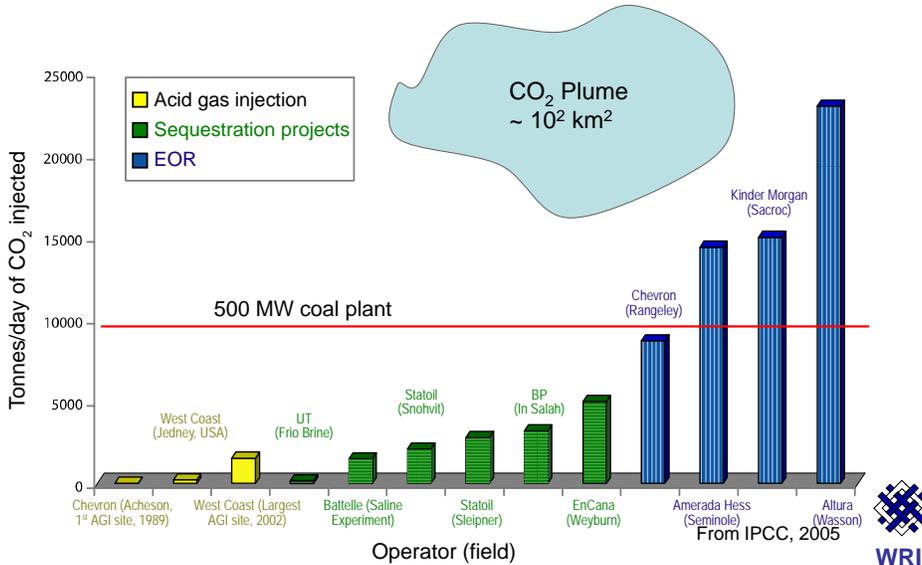


In most of these scenarios, about 1200 GW of CCS is required by 2050

Energy Technology Perspectives 2006, IEA.



# More Experience With Large Commercial Scale Projects is Needed



## Timing Debate

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- We need to begin large-scale CCS deployment immediately on multiple fronts. The climate system cannot wait.
- We need to gather more information first. If there is an early mistake, CCS could be permanently removed from our list of mitigation options, preventing its use even when the technology is more mature.



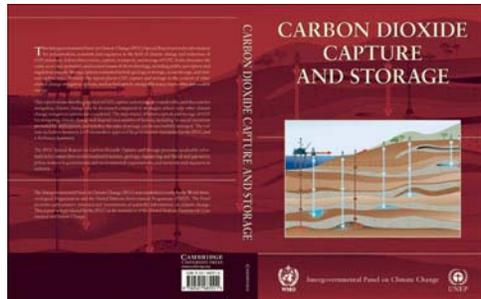
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# What Do We Know About the Risks of Geological Storage of CO<sub>2</sub>?



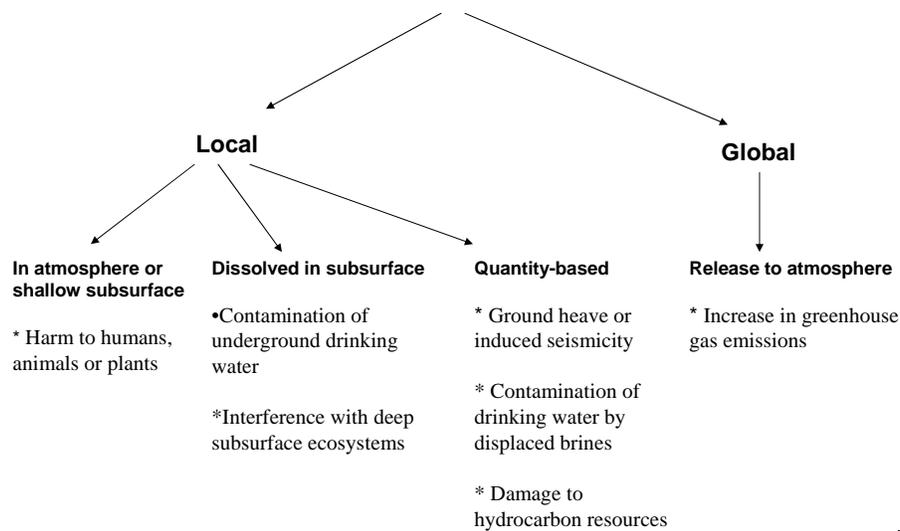
<http://www.ipcc.ch/activity/csspm.pdf>

*“ With **appropriate site selection** informed by available subsurface information, a **monitoring program** to detect problems, a **regulatory system**, and the **appropriate use of remediation methods** to stop or control CO<sub>2</sub> releases if they arise, the **local health, safety and environment risks of geological storage would be comparable to risks of current activities such as natural gas storage, EOR, and deep underground disposal of acid gas.**”*



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## Potential Carbon Dioxide Risks



Source: Adapted from Wilson, Johnson et al. 2003



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## Selected Legal Issues

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- Legal and regulatory analogs exist, but none fit perfectly
  - CO<sub>2</sub>-EOR: Done to maximize oil recovery, not sequester CO<sub>2</sub> permanently or for credits
  - Natural gas storage: well-understood reservoirs; not done in saline aquifers
  - Acid gas injection: relatively small volumes
- CO<sub>2</sub> currently not regulated, but...
- Safe Drinking Water Act/UIC
- Diversity among states



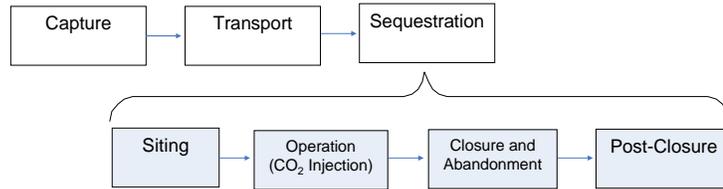
## Selected Legal Issues

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- Capture and transport phases
- Siting
  - Access to and ownership of large reservoirs
    - Eminent domain, unitization
- Operation
  - Injection wells
  - Measuring, monitoring and verification
  - Accounting
- Closure
- Liability/Long-term care



## Phases of CCS Liability

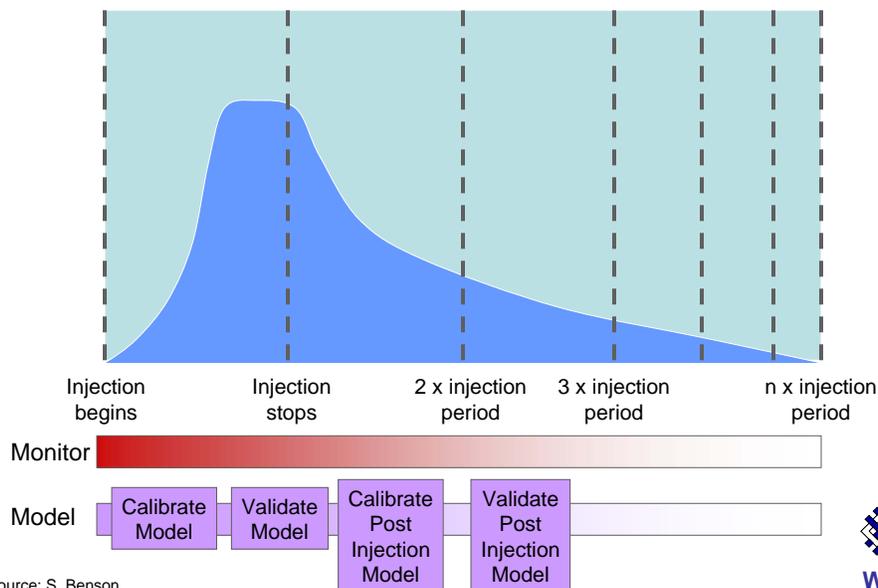


<b>Risk Area/Liability</b>	Large/legal reservoirs; geophysical trespass	Leakage to surface; groundwater, minerals; seismicity; trespass	Leakage to surface; groundwater, minerals; seismicity; trespass	Leakage to surface; groundwater, minerals; seismicity; trespass
<b>Regulatory Authority</b>	Legislature; courts	EPA/UIC; OSHA; state regulator	EPA/UIC; state regulator	Legislature/Congress; EPA; courts
<b>Potentially Responsible Party</b>	Developer	Operator	Operator	Operator; long-term responsible entity
<b>Stakeholders</b>	Surface, mineral owners	Surface, mineral, groundwater workers	Surface, mineral owners	Surface, mineral owners; public; env't

Source: Wilson and de Figueroa, forthcoming.



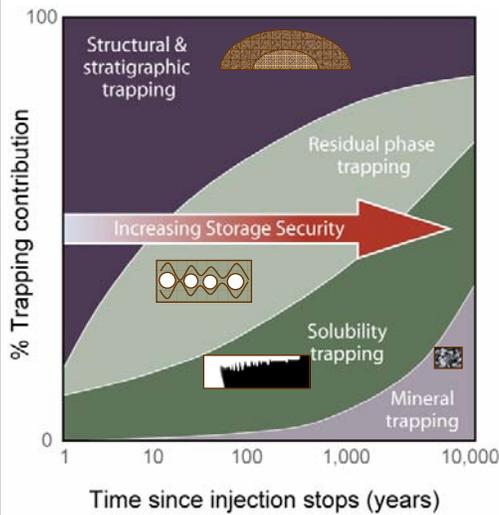
## Conceptual Risk Profile



Source: S. Benson



## Longer Term Issues: Post Injection



Source: S. Benson, LBNL



- Storage security increases over time
  - Secondary trapping mechanisms
  - Pressure decline
- Time frames are site specific
- Projects can be engineered to enhance trapping
- Monitoring can demonstrate longer term performance
- Eventually, a high degree of assurance will be achieved

## Long-term Liability

- Private entities not likely to develop CCS projects if held responsible “forever”
- Private entities have limited lifetimes
- Need to pass on monitoring and potential remediation responsibility to public entity at some point after closure. Under what conditions? How long?
- Relative requirements of financial responsibility framework (insurance, self insurance, indemnification, sinking funds, bonds) can create perverse incentives
- Jurisdiction differences between states significant



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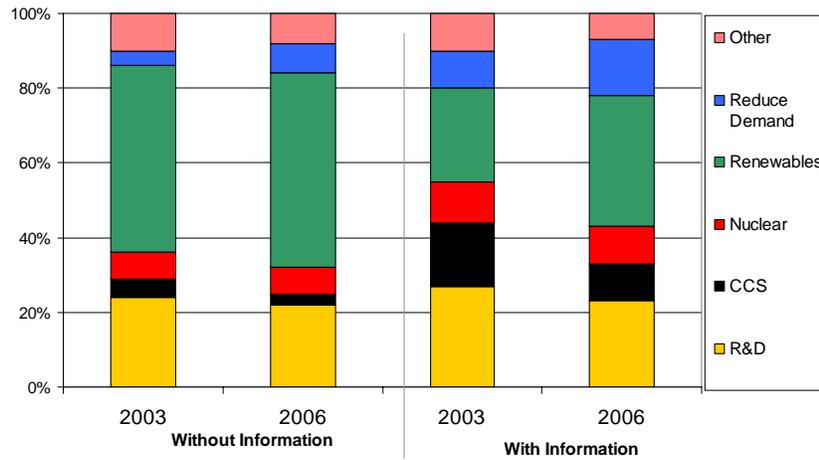
# Forming public views on CCS

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- Who is “the public”?
- Low awareness of climate change and energy issues/options
- Perceived vs. actual risk
- Importance of initial projects
- Trust in messenger
- Trade-offs, cost
- Local stakeholders: NUMBY?



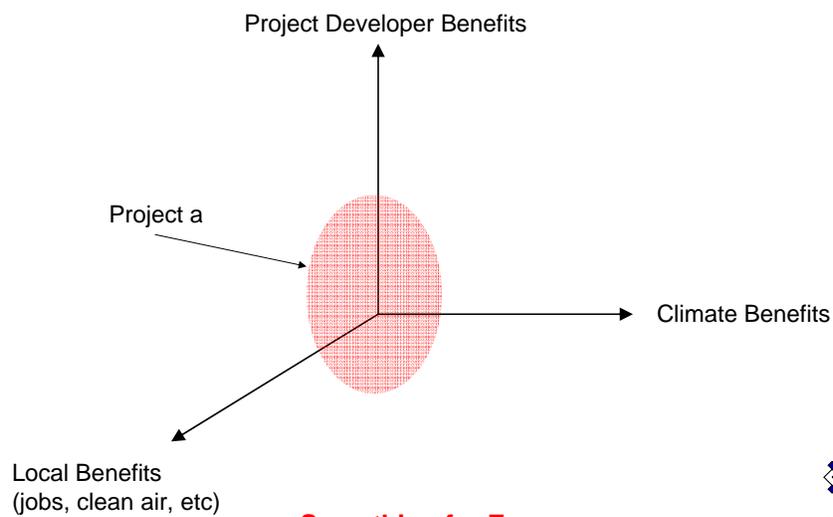
## Public support for different climate change mitigation strategies



Source: Adopted from MIT Carbon Sequestration Initiative, 2006 Survey.



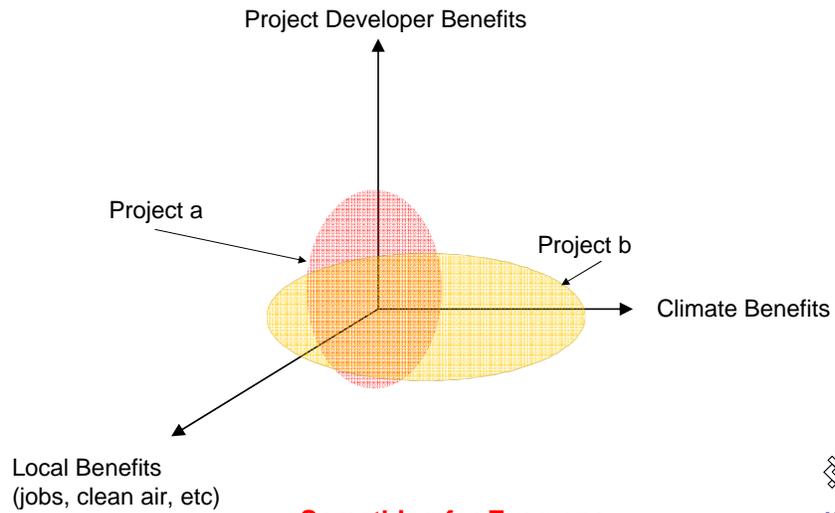
## Meeting CCS Thresholds



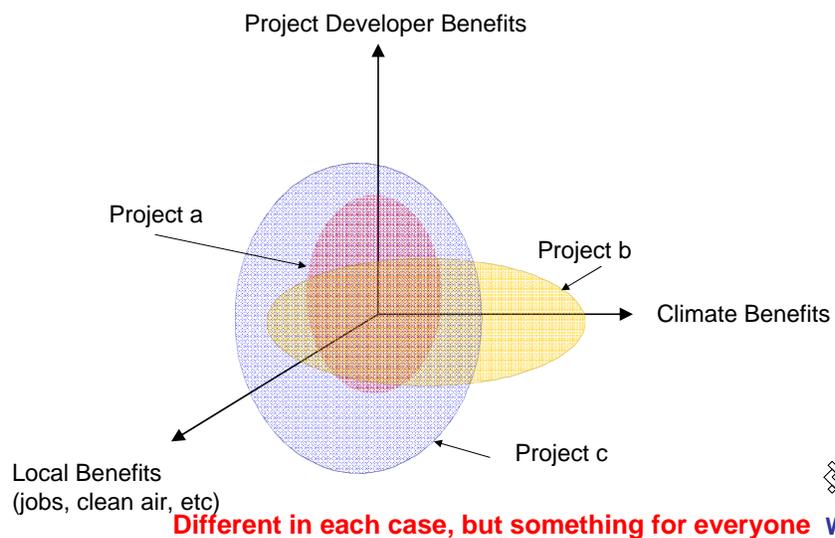
Something for Everyone



# Meeting CCS Thresholds



# Meeting CCS Thresholds



# Public Participation

## IAP2 Public Participation Spectrum

Developed by the International Association for Public Participation

**INCREASING LEVEL OF PUBLIC IMPACT**

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
<b>Public Participation Goal:</b> To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions.	<b>Public Participation Goal:</b> To obtain public feedback on analysis, alternatives and/or decisions.	<b>Public Participation Goal:</b> To work directly with the public throughout the process to ensure that public issues and concerns are consistently understood and considered.	<b>Public Participation Goal:</b> To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	<b>Public Participation Goal:</b> To place final decision-making in the hands of the public.
<b>Promise to the Public:</b> We will keep you informed.	<b>Promise to the Public:</b> We will keep you informed, listen to and acknowledge concerns and provide feedback on how public input influenced the decision.	<b>Promise to the Public:</b> We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	<b>Promise to the Public:</b> We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	<b>Promise to the Public:</b> We will implement what you decide.
<b>Example Tools:</b> <ul style="list-style-type: none"> <li>• Fact sheets</li> <li>• Web Sites</li> <li>• Open houses</li> </ul>	<b>Example Tools:</b> <ul style="list-style-type: none"> <li>• Public comment</li> <li>• Focus groups</li> <li>• Surveys</li> <li>• Public meetings</li> </ul>	<b>Example Tools:</b> <ul style="list-style-type: none"> <li>• Workshops</li> <li>• Deliberate polling</li> </ul>	<b>Example Tools:</b> <ul style="list-style-type: none"> <li>• Citizen Advisory Committees</li> <li>• Consensus-building</li> <li>• Participatory decision-making</li> </ul>	<b>Example Tools:</b> <ul style="list-style-type: none"> <li>• Citizen juries</li> <li>• Ballots</li> <li>• Delegated decisions</li> </ul>

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• Perceived effort to “manage” public reaction

• Columns 1&2

• Need more columns 3, 4 & 5

Source: <http://iap2.org/practitionertools/spectrum.pdf>

## Building Public Acceptance for CCS

Robust, transparent and inclusive regulations are needed to command public confidence in CCS

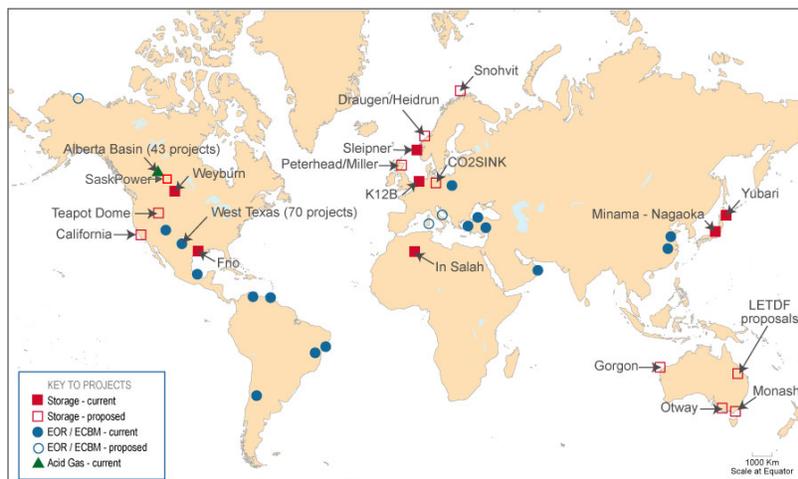


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## Carbon Dioxide Capture and Storage is a Growing CO<sub>2</sub> Mitigation Option



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# Conclusions

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- Site selection is critical: done poorly, the need for clumsy downstream action expands dramatically
- Heavy MMV is required for early projects to satisfy public acceptability and accounting requirements
- Government must take long-term liability, but how and when?
- Public dialogue on CCS must expand to build trust; transparent and robust regulatory framework needed for long-term public support

